CLAIMS

What is claimed is:

1. An optical attenuator comprising:

at least one polarizing element having an optical polarization axis, wherein the polarizing element transmits a portion of an incident light signal proportional to the angular difference between an optical polarization axis of the incident light signal and that of the polarizing element; and

a variable faraday rotator including:

a semi-transparent material;

a magnetic material for applying a magnetic force to a light signal that is passed through the semi-transparent material; and

a conductive wire configured to induce a magnetic field on the magnetic material when a current is passed through the conductive wire.

2. The optical attenuator of claim 1, wherein the polarizing element comprises a polarizer having a linear optical polarity.

3. The optical attenuator of claim 1, wherein the semi-transparent material comprises a garnet.

4. The optical attenuator of claim 1, wherein the magnetic material comprises a hard ferromagnetic material.

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5. The optical attenuator of claim 1, wherein the semi-transparent material is at least partially enclosed in the magnetic material.

6. The optical attenuator of claim 1, wherein the conductive wire is wrapped around the magnetic material.

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7. A laser package comprising:

a laser light source;

a first polarizing element having an optical polarization axis and in optical communication with the laser light source, wherein the first polarizing element transmits a portion of an incident light signal proportional to the angular difference between an optical polarization axis of the incident light signal and that of the first polarizing element;

a variable faraday rotator in optical communication with the first polarizing element and including:

a semi-transparent material;

a magnetic material configured to apply a magnetic force to a light signal that is passed through the semi-transparent material; and

a conductive wire configured to induce a magnetic field on the magnetic material when a current is passed through the conductive wire; and

a second polarizing element having an optical polarization axis and in optical communication with the variable faraday rotator, wherein the second polarizing element transmits a portion of an incident light signal proportional to the angular difference between an optical polarization axis of the incident light signal and that of the second polarizing element.

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8. The laser package of claim 7, wherein the laser light source comprises a semiconductor laser or a gas laser.

9. The laser package of claim 7, wherein the laser light source comprises a distributed feedback laser.

10. The laser package of claim 7, wherein the polarizing elements each comprise a polarizer having a linear optical polarity.

11. The laser package of claim 7, wherein the semi-transparent material comprises a garnet.

12. The laser package of claim 7, wherein the magnetic material comprises a hard ferromagnetic material.

13. The laser package of claim 7, wherein the semi-transparent material is at least partially enclosed in the magnetic material.

14. The laser package of claim 7, wherein the conductive wire is wrapped around the magnetic material.

15. An optical transceiver package comprising the laser package of claim 7.

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16. A laser package comprising:

a laser light source;

a first polarizing element having an optical polarization axis and in optical communication with the laser light source, wherein the first polarizing element transmits a portion of an incident light signal proportional to the angular difference between an optical polarization axis of the incident light signal and that of the first polarizing element;

a faraday rotator in optical communication with the first polarizing element and including:

a semi-transparent material; and

a magnetic material at least partially surrounding the semi-transparent material and configured to apply a magnetic force to a light signal that is passed through the semi-transparent material;

a second polarizing element having an optical polarization axis and in optical communication with the faraday rotator, wherein the second polarizing element transmits a portion of an incident light signal proportional to the angular difference between an optical polarization axis of the incident light signal and that of the second polarizing element;

a variable faraday rotator in optical communication with the second polarizing element and including:

a semi-transparent material;

a magnetic material configured to apply a magnetic force to a light signal that is passed through the semi-transparent material; and

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a conductive wire configured to induce a magnetic field on the magnetic material when a current is passed through the conductive wire; and

a third polarizing element having an optical polarization axis and in optical communication with the variable faraday rotator, wherein the third polarizing element transmits a portion of an incident light signal proportional to the angular difference between an optical polarization axis of the incident light signal and that of the third polarizing element.

17. The laser package of claim 16, wherein the laser light source comprises a semiconductor laser or a gas laser.

18. The laser package of claim 16, wherein the laser light source comprises a distributed feedback laser.

19. The laser package of claim 16, wherein the polarizing elements each comprise a polarizer having a linear optical polarity.

20. The laser package of claim 16, wherein the semi-transparent materials comprise garnet.

21. The laser package of claim 16, wherein the magnetic material of the faraday rotator comprises a permanent magnet or a premagnetized hard ferromagnetic material.

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22. The laser package of claim 16, wherein the magnetic material of the variable faraday rotator comprises a hard ferromagnetic material.

23. An optical transceiver package comprising the laser package of claim 16.

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24. A laser package comprising:

a laser light source;

a first polarizing element having an optical polarization axis and in optical communication with the laser light source, wherein the first polarizing element transmits a portion of an incident light signal proportional to the angular difference between an optical polarization axis of the incident light signal and that of the first polarizing element;

a faraday rotator in optical communication with the first polarizing element and including:

a semi-transparent material; and

a magnetic material at least partially surrounding the semi-transparent material and configured to apply a magnetic force to a light signal that is passed through the semi-transparent material;

a variable faraday rotator in optical communication with the faraday rotator and including:

a semi-transparent material;

a magnetic material configured to apply a magnetic force to a light signal that is passed through the semi-transparent material; and

a conductive wire configured to induce a magnetic field on the magnetic material when a current is passed through the conductive wire; and

a second polarizing element having an optical polarization axis and in optical communication with the variable faraday rotator, wherein the second polarizing element transmits a portion of an incident light signal proportional to

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the angular difference between an optical polarization axis of the incident light signal and that of the second polarizing element.

25. The laser package of claim 24, wherein the laser light source comprises a semiconductor laser or a gas laser.

26. The laser package of claim 24, wherein the laser light source comprises a distributed feedback laser.

27. The laser package of claim 24, wherein the polarizing elements each comprise a polarizer having a linear optical polarity.

28. The laser package of claim 24, wherein the semi-transparent materials comprise garnet.

29. The laser package of claim 24, wherein the magnetic material of the faraday rotator comprises a permanent magnet or a premagnetized hard ferromagnetic material.

30. The laser package of claim 24, wherein the magnetic material of the variable faraday rotator comprises a hard ferromagnetic material.

31. An optical transceiver package comprising the laser package of claim 24.

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32. A method of attenuating a light signal, comprising:

directing a light signal from a laser light source to a first polarizing element having an optical polarization axis;

transmitting at least a portion of the light signal proportional to the angular difference between an optical polarization axis of the light signal and that of the first polarizing element to a variable faraday rotator; and

directing the light signal from the variable faraday rotator to a second polarizing element.

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